CHAPTER 5
SI EVALUATION

This chapter discusses activities that occur after analytical data and non-sampling information from the SI have been received or collected. These activities include review and validation of analytical data, identification of analytical data for scoring, review of non-sampling information, and site scoring.

The most important decision made after any SI is whether further investigation is necessary. If so, the investigator should establish the purpose and scope of the additional investigation. If not, the site is ready to be scored or deemed SEA. The type and quantity of scoring information needed on the objectives of the SI– for example, the data needed to screen the site from further Superfund investigation will differ from the data needed to fulfill HRS documentation requirements.

5.1 REVIEW AND VALIDATE ANALYTICAL DATA

Before scoring the site, the investigator should evaluate previous results (e.g., PA, earlier SI, State investigations, emergency response actions, owner/operator investigations) and new SI results. These results include analytical data and non-sampling information. Chapter 3 of this guidance discusses evaluating previous results in planning the SI; this section discusses how to integrate all data for scoring.

All analytical data should be evaluated for validity and applicability before scoring. Site assessment validation includes review of laboratory analyses and comparison of the body of data to performance criteria. The investigator or project chemist should evaluate analytical data and laboratory information to determine whether sampling protocols and procedures used Regionally approved methods. The reviewer should examine:

- Sampling dates, locations, depths, and descriptions
- Sample collection and preparation techniques
- Laboratory preparation techniques, analytical methods, and analytical results
- Method detection limits or sample quantitation limits
- QA/QC samples
- Documentation

The investigator, assisted by the project chemist, QA/QC personnel, and the laboratory, is responsible for obtaining valid and usable analytical data. Table 5-1 identifies data review considerations.

Laboratory data packages are validated according to guidelines established in the SI work plan. Items reviewed during the data validation process depend on the QA objectives of the data user (usually determined by EPA Regions or States). Data that may need to be validated include:

- Sample holding times
- Initial and continuing calibration verification
- Interference check sample for inorganics
- determination of bias (percent recovery)
- Precision (e.g., replicate analysis)
- Detection limits
- Confirmed identification data

Professional judgment is used to validate the overall data package. The reviewer should comment on SI sample sets if several QC criteria are out of specification. The additive nature of QC factors out of specification is difficult to assess, but the reviewer should inform the user about data quality and limitations. This helps avoid applying the data inappropriately, while still allowing exclusion of the data. The reviewer should be provided with the data quality objectives (DQOs) of the SI samples.

TABLE 5-1: DATA REVIEW CONSIDERATIONS

- **G** Review data reports for transcription and typographical errors (e.g., 0.5 v. .05; ppb v. ppm)
- **G** Determine if sampling protocols were appropriate
- **G** Compare data against field and trip blanks to detect cross-contamination
- **G** Compare field replicates samples
- **G** Review laboratory QC (e.g., laboratory blanks, method standards, spike recovery, duplicates)
- **G** Summarize detection limits for non-detectable results
- **G** Review detection limits for positive but non-quantifiable data
- **G** Review sampling program design for assessing media variability
- **G** Review background concentrations to help identify site-specific contamination
- **G** Delete unusable data, attach qualifiers to usable data, and explain limitations of qualified data

Guidance for Data Useability in Site Assessment discusses data validation procedures in more detail.

The reviewer verifies the usability of analytical results by reviewing QC samples and qualifiers. Routine CLP analyses have well-defined reporting requirements, while special CLP analyses and non-CLP analyses have differing requirements. The review assesses overall analytical performance, considering both the laboratory and the methods. In some cases, the data reviewer may have to notify the laboratory to resolve performance problems (e.g., to retrieve missing information, request re-analysis of samples from extracts, or request construction and re-interpretation of analytical results).

The scope of data review depends on user requirements. Communication between the data reviewer and the project chemist is crucial during data evaluation. The chemist should interpret issues resulting from the data review and correlate analytical review with site-specific information, such as physical conditions at the site that affect sample results.

During data validation, problems with the data package sometimes prevent the reviewer from adequately qualifying the data, especially if raw data, chain-of-custody, traffic reports, or data reporting forms are missing. If the reviewer's sample calculations do not match the laboratory results, the reviewer should contact the laboratory. Samples analyzed according to special CLP methods (or non-CLP methods) may require verification of sample quantitation limits, methods of extraction (particularly for fish tissue), and analytical procedures.

5.2 IDENTIFY ANALYTICAL DATA FOR SCORING

Investigators may use analytical data differently to screen a site than to list a site. Investigators should refer to *Guidance for Data Useability in Site Assessment* and *Hazard Ranking System (HRS) Guidance Manual* for further information on the application of analytical data and guidelines to apply data to list sites. The following HRS aspects generally depend on analytical data:

- Observed releases
- Observed contamination (soil exposure pathway only)
- Targets exposed to actual contamination
- Levels of target contamination
- Hazardous waste quantity, particularly constituent quantity

The investigator's professional judgment determines whether the quality of analytical data are adequate for

scoring. Sometimes non-CLP data provided by other parties or generated by EPA during previous investigations, such as emergency response actions, may be used. Examples include the following.

- Analytical data obtained from the site owner without accompanying QA/QC information may be used if the data are reasonable for their intended use and can be applied in a similar manner as SI analytical data.

- Data supplied by local or State authorities (e.g., county health department) indicating high concentrations of a particular hazardous substance in surficial soils at the site may be used if that substance can be attributed to the site.

The SI investigator must attempt to obtain QA/QC documentation for the results. Concentrations from non-CLP data provided by other parties or from previous EPA investigations most likely support observed contamination and should be used to evaluate waste characteristics and other HRS factors (e.g., containment, human population targets).

The primary source of laboratory services for the SI are Regional Laboratories and the CLP. However, other analytical services may be more appropriate than CLP and generate data of comparable or acceptable quality. The minimum data quality acceptable for SI scoring depends on:

- Intended use of the data (e.g., to screen or list the site;
- Specific site hypothesis being tested (e.g., suspected surficial contamination); and
- Particular HRS factor being evaluated (e.g., hazardous waste constituent quantity).

CLP data may be qualified during laboratory analysis or data validation. Qualified data may be more useful for focused SI screening than to meet the listing objectives during a single or expanded SI. Qualified data (coded as "J", "U", "UJ", or "R") generally represent estimated concentrations that are qualitatively correct but may not meet specifications for quantitative accuracy and precision. Qualified data may be used only if the bias (unknown, low, high) associated with the data and the reasons for qualification are known. Some qualified data still may not be appropriate to develop a score for listing. The investigator should refer to *Guidance for Data Useability in Site Assessment* and *Hazard Ranking System* (HRS) *Guidance Manual* for detailed information on using qualified data to list a site.

Analytical data of unknown quality are generally not adequate to score a site. However, previous data meeting minimum usability requirements may be combined with SI data to test site hypotheses. Similarly, data not meeting minimum requirements may be used if subsequently confirmed by SI data.

EPA has established three data use categories (DUCs) (see Table 5-2):

- **DUC-I data**(e.g., CLP data are the most rigorous and are associated with a high degree of confidence.
- **DUC-II data** lack the detailed validation procedures of DUC-I.
- **DUC-III data** (e.g., qualitative concentration ranges reported by health and safety monitoring instruments) are the least rigorous and are associated with a low degree of confidence.

Examples of analytical data not adequate to test hypotheses or to score an SI include:

- Background samples with higher concentrations of hazardous substances than onsite samples
- Ground water samples where the matching blanks show contamination possibly due to improper sampling procedures
- Volatile organic analyses for aqueous surface water samples qualified due to excessive holding times

If the analytical data are not adequate to test hypotheses or to score the site, the investigator should talk to EPA Regional officials. The investigator should determine whether the SI objectives can be met regardless of inadequate analytical data. Chapter 6 discusses where additional evaluation may be needed.

5.3 EVALUATE NON-SAMPLING INFORMATION

The SI investigator should evaluate the quality of all non-sampling information and identify factors requiring

TABLE 5-2: DATA USE CATEGORIES (DUC) FOR SI SCORING

HRS FACTOR	SI SCREENING	LISTING
Observed Release/Observed Contamination	DUC-I DUC-II DUC-III	DUC-I DUC-II
Hazardous Waste Constituent Quantity (Tier A)	DUC-I DUC-II	DUC-I
Hazardous Wastestream Quantity (Tier B), Hazardous Waste Volume Quantity (Tier C), or Area Quantity (Tier D), although rarely based on sample results	DUC-I DUC-II DUC-III	DUC-I DUC-II
Area of Observed Contamination	DUC-I DUC-II DUC-III	DUC-I DUC-II
Targets Exposed to Actual Contamination	DUC-I DUC-II DUC-III	DUC-I
Hazardous Substances Associated with Site Sources	DUC-I DUC-II DUC-III	DUC-I DUC-II

additional information. If site conditions have changed since the previous investigation, non-sampling information should be updated during the SI. Changes in site conditions also may affect the SI sampling strategy. Nearby target information, in particular, should be evaluated if considerable time has elapsed since the information was collected. For example:

> While assembling reference materials during the focused SI, the investigator noticed that the SI field logbook mentioned a closed chemical plant adjacent to the site. When the PA was performed, she considered the plant employees the nearest individual factor (air pathway). After further research, she learned the plant had been closed; its closing had no relationship to the site she was evaluating. The HRS value for this factor was modified since the chemical plant was now abandoned and its employees were no longer air pathway targets.

The investigator should ensure that the quality of non-sampling information acceptable. In some cases, this review will identify factors requiring additional information, such as streeamflow or census data.

5.4 SCORE THE SITE

After reviewing and verifying the SI results, the SI investigator must evaluate the site score according to the HRS. The primary difference between PA and SI scoring involves key HRS factors that require analytical data. Several tools are available for scoring:

- SI worksheets
- *PREscore* software package
- Other evaluation tools developed by EPA Regional or State offices

The general approach for site scoring, applying any of these tools, is to characterize and evaluate sources and significant pathways, evaluate releases and targets

exposed to contamination, check scoring, and collect additional information, if needed. This approach may be modified according to the amount of available site information and the types of investigations that have been performed at the site.

For some sites, a preliminary screening score should be calculated. If the screening score is based on non-site specific data–for example, best estimates, information from a nearby CERCLA site, or regional geologic information– the investigator may have to collect more information before completing the site score. The screening score should be evaluated to determine whether more data or additional samples should be collected. As new data become available, the screening score should be updated.

The investigator may use the SI Data Summary tool (Appendix B) to compile analytical data and non-sampling information. These sheets also may serve as a checklist to:

- Summarize previous and new information.
- Identify quantitatively important HRS factors.
- Identify factors that have not been fully evaluated.
- Document data by reference.
- Focus additional data collection efforts.

Completed SI Data Summary sheets may facilitate entering data into *PREscore* or other SI scoring tools.

Generally, if the contribution of a pathway or threat to the overall score is minimal, it should still be qualitatively discussed in the SI narrative report, particularly if partial data are available. This discussion will help present a more complete picture of the conditions and threats at the site and may provide useful information for planning remedial investigations and other work, if necessary.

Investigators should refer to *Hazard Ranking System* (*HRS*) *Guidance Manual* for guidelines to evaluate HRS factors. This directive provides general and technical guidance for investigators applying the HRS to prepare packages for NPL consideration, including general rules for organizing data and information, clarification of HRS terms and concepts, policy issues, effective scoring strategies, and instructions for relatively complex HRS factors.

5.4.1 Scoring Tools

SI worksheets (provided in Appendix C) and other evaluation tools support site screening scores. *PREscore* supports both screening and listing scores. The focused SI investigator may rely on any of these scoring tools. *PREscore* should be used to evaluate the site score for the expanded or single SI.

SI Worksheets

The SI worksheets may be appropriate to score most sites. The investigator may use the worksheets when the SI tests a limited number of hypotheses that are responsible for the PA further action recommendation, for example, a suspected release to surface water and a primary target such as a fishery exposed to actual contamination. In this example, no other pathway or combination of pathways scored high enough to warrant further site investigation. The SI worksheets generate a representative site score without requiring the entry of more complete data into *PREscore*.

The SI worksheets build on PA information and hypotheses by explicitly evaluating analytical data generated during the SI and other investigations. The worksheets quantitatively evaluate the key HRS factors affecting the site score, saving resources by reducing data and documentation requirements for the focused SI. Materials to assist scoring include instructions to evaluate HRS factors, scoresheets, hazardous substance value look-up tables, and hazardous substance chemical benchmark tables. The SI worksheets differ from the PA scoresheets in two significant areas:

- Tables to identify hazardous substances detected in observed releases and at exposed targets replace PA "criteria lists." The tables allow determining the level (e.g., Level I or Level II– see Section 5.4.4 of this guidance) of contamination at exposed targets based on sample concentrations. Applying analytical data, the HRS terms "observed release" and "actual contamination" replace the PA terms "suspected release" and "suspected contamination."

- SI worksheets add substance-specific factors (e.g., toxicity/mobility, toxicity/persistence) and waste characteristics values from 0 to 100 (0 to 1,000 for surface water food chain and environmental threats).

The SI worksheets may be used to evaluate all pathways to reflect the relative importance of each pathway to the overall site evaluation. Minimally contributing pathways or threats should be scored, even if only partial data (e.g., information collected during the PA) are available. For these lesser pathways and threats the SI investigator should provide a brief qualitative discussion of available information in the SI narrative report to present a more complete picture of the conditions and threats at the site. Such information may be used to plan to the expanded SI, if necessary, or to identify additional non-sampling information needs. Scoring all pathways also helps reduce "false negatives" in screening process results.

PREscore

PREscore automates operations to assign HRS factor values, allowing entry and evaluation of site information, including sampling data, hazardous waste quantity and waste characteristics, physical parameters of the site, population data, and other target information. *PREscore* includes *PREprint*, a program that prints HRS scoresheets and a documentation record for sites to be considered for the NPL.

PREscore is the appropriate tool to score some sites, particularly if the focused SI tests serval hypotheses and CLP analytical data establish observed releases sufficiently for HRS documentation. *PREscore* also may be the best tool if the site score is primarily based on potential to release for a significant migration pathway or multiple pathways. Finally, *PREscore* helps propose and screen alternative scoring scenarios (e.g., scoring multiple aquifers or watersheds, observed release versus potential to release), and can save considerable time in evaluating substance-specific waste characteristics.

PREscore should be used to develop the site score for listing purposes (e.g., at the end of the single or expanded SI). This program calculates HRS factors from raw data, retrieves values from hazardous substance look-up tables, calculates site scores, and generates HRS documentation and other records. *PREscore* assists investigators in meeting HRS requirement and minimizes potential mathematical errors in scoring. The *PREscore* user must be familiar with all aspects of the HRS. See *PREscore Software Users Manual & Tutorial* (OSWER Directive 9345.1-04, 1991) for instructions.

TABLE 5-3: SI WORKSHEETS VERSUS *PREscore*

CRITERIA	SI WORKSHEETS	*PREscore*
Amount of Information	Sufficient for screening Incomplete information is generally acceptable	Sufficient for screening or listing Generally requires complete information
Quality of Analytical Data	Variable	High
Effort, Resources Available	Lower	Higher
Importance of Potential to Release Factors	Lesser importance, evaluates only the most critical potential to release factors	Higher importance, evaluates all potential to release factors
Scorer's HRS Experience	Low	High
Number of Pathways to Evaluate	All pathways	Significant pathways
Test Scenarios, Calculate HWQ and SCDM Values	Tricky	Easy

HRS pathways posing significant threats to human health and the environment should be scored using *PREscore*. The term "significant" applies not only to the overall level of relative threat at the site compared to other sites, but also to the level of relative threat for an individual pathway at the site compared to the level of relative threat for other pathways at that same site.

Other less significant pathways or threats may be scored using *PREscore* if:

- Complete information is available for the pathway or threat;
- An observed release (or observed contamination) has been demonstrated for the pathway or threat, regardless of the number of targets exposed to actual contamination; and
- An observed release has not been demonstrated for the pathway or threat, and a large number of targets are exposed to potential contamination.

A combination of the Sl worksheets and *PREscore* may be appropriate to score sites. For example, the SI worksheets may be used to develop a preliminary screening score, i.e., a "back of the envelope" score to scope results and the next steps. After a reviewer experienced with the HRS ensures the SI worksheets justify a more complete scoring effort, the investigator would use *PREscore* to evaluate and document the site score. If the Sl worksheets indicate that the site score will be less than 28.50, *PREscore* may not be necessary. Applied this way, both tools can complement each other to help focus scoring efforts and save resources.

Other Scoring Tools

In addition to *PREscore* and the SI worksheets, other scoring tools are sometimes used by EPA Regional or State offices. These tools should be applied in a consistent manner when developing SI scores. In all cases, these tools should reflect HRS requirements to the extent practicable, and training should be provided to allow investigators to efficiently score sites.

5.4.2 Characterize and Evaluate Significant Site Sources

The investigator should briefly characterize each source (see Table 5-4) by assessing:

- Hazardous substances associated with the source;
- Hazardous waste quantity; and
- Pathways for which the source is evaluated.

Containment characteristics should be investigated for sources that do not contribute to a release to a migration pathway or for any pathway evaluated based on potential to release. Once all sources are characterized for each pathway, target distance limits can be measured.

TABLE 5-4: CHARACTERIZE AND EVALUATE SOURCES

ITEM	SCORING CONSIDERATIONS
Location	Refer to site map or sketch.
Hazardous Substances	Consider analytical data and historical records. Hazardous substances should be associated with the source or the site in general.
Hazardous Waste Quantity	Consider analytical data, historical records, field observations, and aerial photos. Consider qualifying removals.
Eligible Pathways	Indicate pathways for which the source is evaluated.
Containment Characteristics (If necessary)	Identify source type. Consider construction diagrams, historical records, field observations, and analytical data.

For each source, the investigator should characterize wastes deposited to identify the specific hazardous substances associated with the source. Substance-specific characteristics (e.g., toxicity, mobility, persistence) then can be evaluated.

Only substances associated with documented or suspected pathway contamination and substances associated with a source having poor or no containment for the pathway being evaluated are considered. Where a substance can be identified as being present at the site, but the sources of that substance cannot be identified, the substance is considered to be present in all sources at the site, except for sources where available information has ruled out the presence of that substance.

In some cases, samples collected during the SI may be used to refine the hazardous waste quantity evaluation for site sources. For example, surficial soil samples collected during the focused SI may indicate that the area of observed contamination is greater than that indicated by the PA. In most cases, however, the limited number of samples collected during the SI generally will not be sufficient to calculate hazardous waste constituent quantities but may be used to document other hazardous waste quantity measures, such as volume or area of the source.

Investigators should evaluate the sources of site contamination. Sl investigators need not fully evaluate sources, but should briefly describe in the narrative report any source that cannot release hazardous substances to a particular migration pathway, cannot be adequately characterized due to poor or incomplete information (e.g., no reliable evidence indicates the source received hazardous waste), or which has been eliminated by a qualifying removal (*see The Revised Hazard Ranking System: Evaluating Sites After Waste Removals*, OSWER Directive 9345.1-03FS, 1991).

5.4.3 Characterize and Evaluate Significant Pathways

The pathways posing the most significant threat to human health and the environment should be identified and characterized. For example, more than one aquifer may be threatened by hazardous substance releases from the site; therefore, each aquifer should be evaluated for its contribution to the ground water pathway score. Similarly, all watersheds threatened by the site should be considered in evaluating the surface water pathway.

Frequently, sites are recommended for further investigation because a single pathway or threat scores 57 or greater; the evaluation of other pathways or threats may increase a site score already greater than the cutoff score. In many cases, an observed release or observed contamination and targets exposed to actual contamination are needed for the site score to be greater than or equal to 28.50 based on a single pathway or threat. Types of single significant hazards for which a site score may be above the cutoff score include:

- If ground water is the only pathway evaluated, either an observed release or potential to release to large target populations is critical.
- If the surface water drinking water threat is the only threat evaluated, either an observed release or potential to release to large target populations is critical.
- If surface water human food chain threat or environmental threat is the only threat evaluated, a fishery or sensitive environment exposed to actual contamination is critical.
- If surface water human food chain threat is the only threat evaluated, observed release to surface water, but not to the fishery, is critical.
- If soil exposure is the only pathway evaluated, areas of observed contamination and a resident population or terrestrial sensitive environment are critical.
- If air is the only pathway evaluated, an observed release and a population or sensitive environment near the site are critical.

The SI investigator need not score a specific pathway for a given site if:

- No significant targets are associated with the pathway.
- All sources at the site have a containment factor value of 0 for the migration pathway, and no

observed release to that pathway has been demonstrated.

- No observed contamination is established for the soil exposure pathway (e.g., no surficial contamination within 2 feet of the ground surface has been documented).

Pathways or threats that do not significantly contribute to the site score may not require evaluation. However, if the resulting site score is near the cutoff when one or more pathways are not scored, the investigator should score pathways that initially appeared not to be significant.

5.4.4 Evaluate Releases and Targets Exposed to Contamination

Table 5-5 provides general considerations to evaluate targets for each pathway. In addition, the investigator should verify the consistency of target information between pathways. Note that populations vary between pathways. For example, targets for the soil exposure nearby population threat are evaluated based on travel distance; while targets for the air pathway are evaluated based on straight line distance. Also, soil exposure nearby population includes only students, day care centers, and residents, while the air pathway population also includes workers regularly present.

TABLE 5-5: TARGET EVALUATION

PATHWAY	TARGET CONSIDERATIONS
Ground water	Determine targets for each aquifer separately Determine targets exposed to actual contamination and the level of contamination Determine any aquifer discontinuities or interconnections within defined distance limits Determine population served by each target Evaluate standby wells Identify and verify blended water-supply systems Identify resource uses and Wellhead Protection Areas, if necessary
Surface water	Identify water bodies within the target distance limit; determine flow rates (or depths for oceans and Great Lakes): determine whether each water body is fresh water, salt water, or brackish Identify significant surface water targets Determine targets exposed to actual contamination and the level of contamination Identify drinking water intakes and populations served; evaluate standby intakes Identify and verify blended water-supply systems Calculate potentially exposed target values after applying dilution weighting factors Identify resource uses, if necessary
Soil exposure	Determine approximate area of observed contamination Determine whether contamination occurs within the property boundaries of residences, day care centers, or schools, or on terrestrial sensitive environments or resources Determine targets exposed to actual contamination and level of contamination Identify workers and resource uses, if necessary
Air	Evaluate people regularly occupying areas near or on site sources Verify populations near the site (e.g., within 1 mile) Determine targets exposed to actual contamination and level of contamination Identify sensitive environments near the site (e.g., within 1 mile) Identify resource uses, if necessary

Investigators also should make sure that a population is scored for the distance category in which the target is located.

The SI often tests the likelihood of a release or exposure by collecting a limited number of samples to determine whether a pathway exhibits evidence of contamination. For screening purposes, this evidence need not meet HRS requirements to document an observed release (or contamination), but needs to show that it is likely to be documented upon further investigation.

SI samples collected at appropriate locations can be used to evaluate specific substances associated with site operations and containment at a specific source and to test hypotheses regarding suspected releases and targets exposed to actual contamination. For example:

> Based on historical records indicating that plating wastes containing chromium were generated and disposed onsite, a suspected surface water release was hypothesized at the PA. If SI sediment samples from a nearby surface water body receiving runoff from the site show concentrations of chromium above background levels, they could be used to establish a release. However, if these samples showed no elevated concentrations of chromium, the surface water pathway would be evaluated based on potential to release factors, refining the surface water pathway score.

Note that the absence of contamination for a particular pathway based on a one-time sampling event does not necessarily mean that releases have not occurred. Weather conditions, seasonal variations affecting ground water and surface water flow, and the selected sample locations may not be conducive to demonstrating contamination. If other evidence supports presence of contamination, the investigator should collect additional samples during the expanded SI to further test site hypotheses.

Three categories of target contamination (Level I, Level II, and potential) are used to assign HRS values to the nearest target (e.g., well, intake, food chain individual, resident, or individual) and the population and sensitive environment factors:

- **Level I contamination**: concentrations for targets that meet the criteria for observed releases or observed contamination, and are at or above media-specific benchmark concentrations.

- **Level II contamination**: concentrations for targets that either meet the criteria for observed releases or observed contamination but are less than media-specific benchmarks, or meet the criteria for actual contamination based on direct observation.

- **Potential contamination**: targets potentially threatened by releases (i.e., targets that are not actually exposed to contamination via that pathway or threat).

If none of the hazardous substances eligible to be evaluated at a target has an applicable benchmark, the actual contamination at the target is designated Level II. If a hazardous substance benchmark has not been established for a particular hazardous substance, the default level (Level II) is used for targets that meet the criteria for actual contamination.

The investigator should ensure that targets exposed to actual and potential contamination have been adequately documented. Among the three factor categories for an HRS pathway—likelihood of release, waste characteristics, and targets—the targets factor category is the only category that is not limited to a maximum value. Therefore, this category has the largest potential to affect the site score.

During the PA, the investigator hypothesizes whether targets are suspected to be exposed to actual contamination using professional judgement. During the SI, samples are collected to demonstrate the presence or absence of hazardous substances at these targets and to distinguish the level of actual contamination. Note that such sample evidence need not meet HRS requirements to document actual contamination, but only need show that actual contamination is likely to be documented upon further investigation. For example, if samples from nearby drinking water wells have elevated chromium concentrations, they could be used to confirm a PA suspected release to ground water and confirm hypotheses that specific ground water targets are exposed to actual contamination. The chromium

concentrations found in these samples also could be used to distinguish the level of contamination, thus refining the ground water pathway score.

5.4.5 Check Scoring and Collect Additional Information

Personnel with HRS experience should check scores. In most cases, a preliminary site score will accurately indicate whether the site should be considered for further investigation or possible listing. However, this preliminary score may differ from the final score documented for the site. Some of these differences may occur because previous analytical data only partially supported scoring observed releases and targets exposed to actual contamination, but further sampling did not. Some unusual conditions or circumstances may result in an incorrect site recommendation because of simplifications inherent to the SI screening score. Before resources are committed to further investigation, experienced HRS personnel should review the preliminary site score to determine if it is reasonable.

Investigators initially should complete the preliminary score, review all pathway scores, and verify key HRS factors or scoring considerations. Elements that should be verified include:

- Observed releases
- Areas of observed surficial contamination
- Property boundaries for soil exposure targets
- Targets exposed to actual contamination
- Factor values whose data are near a break point to next higher or lower factor value
- Aquifer boundaries, discontinuities, and interconnections
- Quality of analytical data

The preliminary score may indicate that another scoring tool should be used, or that alternative scenarios to score the site may be appropriate. If SI results did not support a PA hypothesis for a significant pathway (e.g., suspected ground water release), the investigator may consider evaluating factors involving the alternate hypothesis (e.g., potential to release to ground water). The investigator should collect additional information to score the pathway, as necessary.

The preliminary site score should be analyzed to determine where more data should be collected during the SI or during additional investigation (e.g., the expanded SI or prior to preparing the HRS package). Additional information should be collected if significant HRS information cannot be adequately documented, or if newer information would change the site score above or below the cutoff.

Also, the investigator should ensure that the available information reflects current site conditions, and is not based on unreasonable, assumptions or estimates, particularly at the end of the single or expanded SI. In some cases, this review will identify factors for which additional information is needed. If conditions have significantly changed since the previous investigation—perhaps due to a residential development, a natural catastrophe, or recent waste disposal activities—the appropriate non-sampling information should be updated during the SI. For example:

> The previous SI was performed in September 1991 for a site consisting of a large surface impoundment. During an October 1992 hurricane, the diking around the impoundment failed. A considerable portion of the site may now be contaminated at the ground surface. Some factors that may require updating include: 1) distance to surface water, 2) source type, and 3) containment. Sampling from the area of surficial contamination also may be appropriate during the next investigation.

For some sites, the investigator may be unable to fully meet the objectives of the SI, particularly with respect to testing site hypotheses. Chapter 6 discusses circumstances where additional evaluation of the Sl results may be necessary.